Ivan Lau | Curriculum Vitae

National University of Singapore, School of Computing, COM2 #-B1-01, 15 Computing Dr, Singapore 117418
https://ivanphlau.github.io/ ivanlau@nus.edu.sg

CURRENT RESEARCH INTERESTS

My current research interests are broadly in the theoretical foundations of trustworthy machine learning (interpretability, robustness, fairness, privacy, causality, and accountability) as well as the applications of machine learning in healthcare.

EDUCATION

Simon Fraser University **Burnaby, BC, Canada**
Master of Science (MSc) in Mathematics September 2019 - August 2021

CGPA: 4.07/4.33
Relevant courses: Applied Functional Analysis, Mathematical Image Processing, Graph Theory, Cryptography, Group & Ring Theory

Thesis: Nonuniform Compressed Sensing Schemes with Sublinear Measurements, Sublinear Time, and Low Entropy (awarded Certificate with Distinction)
Advisor: Jonathan Jedwab
Thesis committee members: Ben Adcock, Weiran Sun (Chair), Paul Tupper (Examiner)

University of Edinburgh **Edinburgh, UK**
BSc (Hons) in Computer Science and Mathematics September 2015 - June 2019

Degree classification: First-Class Honours
Graduate courses: Combinatorial Optimization, Foundations of Data Science, Computational Complexity, Algebraic Geometry, Lie Groups & Lie Algebras, Noncommutative Algebra

Informatics Honours Project: Hermitian Spectral Theory of Mixed Graphs
Mathematics project: Left Braces and the Solutions of the Yang-Baxter Equation (awarded best project)

EMPLOYMENT

Department of Computer Science, National University of Singapore September 2021 - Present
Research Assistant

Department of Mathematics, Simon Fraser University September 2019 - August 2021
Research Assistant

Department of Mathematics, Simon Fraser University September 2019 - December 2020
Teaching Assistant

School of Informatics, University of Edinburgh September 2017 - May 2019
Teaching Assistant

School of Informatics, University of Edinburgh June 2018 - September 2018
Research Intern

RESEARCH EXPERIENCE

Department of Computer Science, National University of Singapore September 2021 - Present
Research Assistant

Supervisor: Jonathan Scarlett
Description: Understanding variants of compressed sensing and group testing beyond standard sparsity assumption (e.g., adding assumptions of prior information that may be utilized, or replacing the sparsity assumption with a generative model assumption)

Department of Mathematics, Simon Fraser University September 2019 - August 2021
Mathematics MSc Thesis

Supervisor: Jonathan Jedwab
Description: Designed compressed sensing schemes which simultaneously achieve low measurement complexity, fast recovery algorithm, and low entropy. Thesis was awarded Certificate with Distinction and led to a conference publication [C1].

School of Mathematics, University of Edinburgh September 2018 - April 2019
Undergraduate Mathematics Project

Supervisor: Agata Smoktunowicz
Description: Studied the algebraic structures related to Yang-Baxter equation. I resolved the question asked by Cedó, Gateva-Ivanova and Smoktunowicz (2018). Project was awarded William and Isabella Dick Fourth Year Project Prize, and led to a journal publication [J1].

School of Informatics, University of Edinburgh September 2018 - April 2019
Informatics Honours Project

Supervisor: He Sun
Description: Built the spectral theory of directed and mixed graphs in Hermitian representations, as an attempt to circumvent the inconvenience caused by the complex eigenvalues in the conventional binary adjacency matrix representation. This extends the work done in my research internship below.

School of Informatics, University of Edinburgh June 2018 - September 2018
Research Intern

Supervisor: He Sun
Description: Built the spectral theory of directed and mixed graphs in Hermitian representations, as an attempt to circumvent the inconvenience caused by the complex eigenvalues in the conventional binary adjacency matrix representation.

PUBLICATIONS

Preprint

[P1] Hooman Zabeti, Nick Dexter, **Ivan Lau**, Leonhardt Unruh, Ben Adcock, Leonid Chindelevitch. Group Testing Large Populations for SARS-CoV-2, 2021.

Journal Paper

[J1] **Ivan Lau**. An Associative Left Brace is a Ring. *Journal of Algebra and Its Applications*, 19(09): 2050179, 2020

Conference Paper

[C1] **Ivan Lau** and Jonathan Jedwab. Construction of binary matrices for near-optimal compressed sensing. *2021 IEEE International Symposium on Information Theory* (ISIT), pages 1612–1617, 2021.

TALKS

From the YBE to the Left Braces — June 2019
Groups, Rings and Associated Structures 2019 — Spa, Belgium
The only undergraduate speaker

Left Braces and the Yang-Baxter Equation — February 2019
Institute of Mathematics & its Applications: Tomorrow's Mathematicians Today 2019 — London, UK

TEACHING EXPERIENCE

Simon Fraser University

Calculus Workshop (Teaching Assistant)	Fall 2020
Applied Calculus Workshop (Teaching Assistant)	Summer 2020
Computing with Linear Algebra (Teaching Assistant)	Spring 2020
Algebra Workshop (Teaching Assistant)	Spring 2020, Fall 2019

University of Edinburgh

Informatics 2B - Algorithms, Data Structures, Learning (Tutor)	Spring 2019
Informatics 2D - Reasoning and Agents (Tutor)	Spring 2019, Spring 2018
Algorithms and Data Structures (Tutor)	Spring 2019
Discrete Mathematics and Mathematical Reasoning (Tutor, Marker)	Fall 2018, Fall 2017
Informatics 1 - Cognitive Science (Python Lab Demonstrator)	Spring 2018

AWARDS AND HONOURS

Simon Fraser University Department of Mathematics Certificate "With Distinction"	2021
Simon Fraser University Graduate Fellowship ($6500 CAD)	2020
Simon Fraser University Special Graduate Entrance Scholarship ($5000 CAD)	2019
University of Edinburgh William and Isabella Dick Fourth Year Project Prize	2019
Malaysian Public Service Department Overseas Full-Ride Undergraduate Scholarship	2015
Malaysian Computing Challenge (Perfect Score)	2014, 2013
Malaysian National Mathematical Olympiad (4th - 13th Place Bracket)	2013
International Competitions and Assessments for School (Gold Medal in Science)	2012

ACTIVITIES

University of Edinburgh InfBase Tutor	2017 - 2019
University of Edinburgh MathPALs Academic Practices Officer	2017 - 2018
Microsoft UK Student Partner Editor	2015 - 2016
University of Edinburgh Contours Magazine Editor	2015 - 2016
University of Edinburgh Mathematics Year 1 Student Representative	2015 - 2016

Skills

LaTeX, Python, R, MATLAB